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20995	7590	12/12/2005	EXAMINER	
KNOBBE MARTENS OLSON & BEAR LLP			BUEKER, RICHARD R	
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FOURTEENTH FLOOR			PAPER NUMBER	
IRVINE, CA 92614			1763	

DATE MAILED: 12/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/629,029

Applicant(s)

SHERO ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 76-114, 116 and 117 is/are pending in the application.
- 4a) Of the above claim(s) 89 and 103-111 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 76-88, 90-102 and 112-114 is/are rejected.
- 7) ☒ Claim(s) 116 and 117 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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Claims 116 and 117 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 116 and 117 are dependent on a cancelled claim.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 76-87, 90, 91 and 93-102 are rejected under 35 U.S.C. 103(a) as obvious over Lei (6,718,126) taken in view of Tasaki (5,904,771) and Raaijmakers (2001/0024387). Lei discloses a sublimation apparatus for supplying precursor vapor to an ALD chamber, the sublimation apparatus comprising a support medium onto which a solid source for vapor reactant is coated. The support medium is configured to guide carrier gas through the support medium to facilitate saturation of the carrier gas with vapor of the solid source material. Lei doesn't discuss the use of a flowable support medium onto which the solid source material is coated. Tasaki (Figs. 1-4, for example)

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discloses a solid source vaporizer comprising a plurality of packed flowable support elements. Tasaki teaches that his vaporizer provides a desirably uniform gas concentration for long periods of time, and for that reason it would have been obvious to one skilled in the art to use the vaporizer of Tasaki as the vapor source for an ALD chamber of the type taught by Lei. Regarding the limitation of "to facilitate saturated pulsing of the carrier gas" added to claims 76 and 87, it is noted that Raaijmakers (2001/0024387) (see para. 91, for example), teaches that a mechanism for providing pulses of gas (which includes the carrier gas) is a conventional part of an ALD system. It would have been obvious to one skilled in the art to provide the ALD apparatus of Lei (and modified by the use of a vaporizer of the type taught by Tasaki) with a gas pulsing mechanism in view of Raaijmakers. It is noted that Posa (4,747,367) and Conger (4,747,367) are incorporated by reference by Raaijmakers at paragraph 91 thereof and are included in the disclosure of Raaijmakers. Posa and Conger teach how to create a flow of vapor in a vaporizer and then use a gas-switching manifold fitted with gas switching valves to cause alternating pulses of the vapor from the vaporizer to flow through the reactor. It would have been obvious to one skilled in the art to connect the source gas vaporizer of Tasaki to an ALD reactor having a gas pulsing mechanism of the type suggested by Raaijmakers, because (1) Lei teaches that it is desirable to connect a solid source vaporizer to an ALD reactor, wherein the solid source vapor source supplies a saturated vapor, and (2) Raaijmakers teaches that it is desirable to feed source vapor to an ALD reactor in a pulsed manner

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Claim 88 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126) taken in view of Tasaki (5,904,771) and Raaijmakers (2001/0024387) for the reasons stated in the rejection of claim 87 above, and taken in further view of Londergan (6,720,259) (col. 3, lines 53-64), who teaches the use of a solid source of  $\text{HfCl}_4$  with carrier gas for ALD processes. It would have been obvious to one skilled in the art to use the solid source vaporizer of Tasaki for supplying  $\text{HfCl}_4$  because Tasaki teaches that his vaporizer is effective for vaporizing solid sources.

Claims 92 and 96-98 rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126) taken in view of Tasaki (5,904,771) and Raaijmakers (2001/0024387) for the reasons stated in the rejection of claim 87 above, and taken in further view of Onoe (6,270,839) (see Figs. 1 and 3, for example), who teaches the use of a manifold to supply carrier gas to a solid source vaporizer. It would have been obvious to use a manifold as shown by Onoe to supply carrier gas to Tasaki's vessel to provide more even distribution of gas.

Claims 112-114 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gartner (4,883,362). Gartner discloses a sublimation apparatus for producing a vapor reactant comprising a sublimation vessel containing a bed of solid source material in the form of powder, and a guidance structure that provides a substantially helical pathway for carrier gas. The vessel has an inlet port and an outlet port and a coiled flow path 70 to 100 cm in length. Gartner doesn't state the distance between the inlet and outlet, but it is clear from Gartner's disclosure that the helical pathway is inherently or at least obviously greater

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than about 2.5 times the distance between inlet and outlet. Gartner's apparatus includes stacked plates, which can be considered to be stacked trays that "partially" define the helical pathway.

Claims 112-114 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gregg (2004/0016404) who discloses a sublimation apparatus comprising a sublimation vessel containing a bed of solid source material in powder form, including plural guide trays. Gregg teaches (para. 58) that his trays include guiding structures that cause carrier gas flow with a "whirlpool effect" that inherently causes the gas to flow in a helical path.

Applicants have argued that the support medium of Lei is not flowable. It is noted, however, that Tasaki teaches that it is desirable to use a flowable support medium to produce a saturated vapor stream. Lei desires a saturated vapor for supplying his ALD reactor. For that reason it would have been obvious to use the saturated vapor source taught by Tasaki as the source of saturated vapor that Lei desires for his ALD reactor.

Applicants have argued that Lei does not teach saturated pulsing of the carrier gas. It is noted, however, that Raaijmakers makes clear that it is desirable to provide a source vapor pulsing mechanism when depositing a coating in an ALD reactor. For that reason it would have been obvious to provide the ALD reactor with a source vapor pulsing mechanism of the taught by Raaijmakers for use in supplying source vapors to an ALD reactor. Since Lei teaches that the source vapor source that is supplied to an ALD reactor should be a carrier gas that is saturated with the source vapor, it would

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have been obvious to use the pulsing mechanism suggested by Raaijmakers to pulse saturated source vapor.

Applicants have argued that Gartner's carrier gas pathway is a spiral and is not helical. It is noted, however, that the definition of "helical" (see attached definitions) includes "spiral". Also, "helix" is defined as "any spiral, either lying in a single plane or, esp., moving around a cone cylinder etc." By these definitions, the spiral of Gartner can properly be considered a helix. It is noted also that applicants' Fig. 8A shows a spiral of the type disclosed by Gartner, and applicants at paragraph 36 of their specification describe Fig. 8A as having a helical flow guide.

Applicants have argued that in Gregg's apparatus, the helical whirlpool effect is effected in each of the multiple "pores" between any two trays and does not define a helical pathway through stacked trays. It is noted, however, that this argument does not cite a specific limitation of claim 112 that is not met by Gregg's disclosure. A careful review of the claim language of claim 112 shows that it reads on Gregg's apparatus. For example, the carrier gas guidance structure of Gregg as a whole does contact the solid source as required. Also, Gregg's guidance structure is configured to guide the carrier gas to contact the vapor reactant by providing a substantially helical pathway for the carrier gas as required, because Gregg's guidance structure includes protuberances 30 that do provide a substantially helical (whirlpool) pathway for the carrier gas, and the protuberances do guide the carrier gas to contact the vapor reactant which is in existence in the space at the outlet 36 of the protuberance. Also, the guidance structure



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of Gregg as a whole does comprise a plurality of stacked trays partially defining levels of the helical (whirlpool) pathway.

Posa (4,747,367) and Conger (4,761,269) are cited of interest. It is noted that Posa and Conger are incorporated by reference by Raaijmakers at paragraph 91 thereof and are included in the disclosure of Raaijmakers. Posa and Conger teach how to create a flow of vapor in a vaporizer and then use a gas-switching manifold fitted with gas switching valves to cause alternating pulses of the vapor from the vaporizer to flow through the reactor.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Bueker  
Primary Examiner  
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